

Writing for a Purpose: Journal Writing

MATHEMATICS

Journal writing in mathematics is a tool that can positively affect attitudes toward the subject, skill development, and concept mastery. Furthermore, journals allow teachers to see into student reasoning, rather than simply testing output. So from these two perspectives, journal writing in mathematics offers students not only a growth opportunity but also the opportunity to receive better-focused teaching strategies. It should be seen both as a learning tool and as a coaching tool.

"When students learn to use language to find out what they think they become better writers and thinkers." (Joan Countryman, 1992)

Purpose

- Provide students with a *safe place* in which they are able to test ideas i.e. to be able to express ideas and be willing to be wrong.
- Provide a vehicle for feedback to students which supports, encourages and challenges rather than judges.
- To inform and focus instruction.

Payoff

Students will:

- become better thinkers and writers
- learn mathematical content and improve problem solving skills.
- overcome math anxiety.
- be given more timely help as teachers become better aware of individual difficulties. ["I realized (more than often) some students were having difficulties – which if it were not for journal writing, I would have overlooked. " (an anonymous Ontario teacher)]

Tips and Resources

- Always have a purpose in mind (something you are truly curious about in terms of student understanding) when assigning journal writing; if you don't, your interest in reading the entries will be low and the benefit to your students will be low.
- Recognize that journals only become vehicles for communication for students. Initial writings may be brief and meaningless to the teacher. [This disappears when writing in math becomes part of the culture of the school.]
- Always use very specific prompts that direct student writing – prompts such as, "What did you learn today?" invite the reply, "Nothing."
- Persistence is required when first introducing writing in the math class: "I am glad that the students are starting to show progress with their math journals." [A teacher from DDSB after 6 weeks of implementing journals.] Many, however, see much quicker progress.
- Do not give in to the temptation to minimize the time spent on modelling (i.e., Class Journals) and practice (i.e., Group Journals).
- To maintain journals as a safe place, consider evaluating the achievement chart category of Communication in writing exercises on paper apart from the journal notebook; use journals for formative assessment.
- Just as a journal is defined to be 'a record of happenings' so teachers should be prepared to read entries that are either a record of happenings in mathematics (learnings) or a record of happenings in the mathematics classroom (e.g., " ... my group kept picking on Ritchie; I didn't learn anything").
- See Teacher Resource, Journal Writing – *Developmental Stages*.
- See Teacher Resource, Journal Writing – *Forms and Sample Stems*.

Further Support

- Consider scheduling journal writing for 5 minutes at either end of a class.

Writing for a Purpose: Journal Writing

MATHEMATICS

What teachers do	What students do
Before <ul style="list-style-type: none"> Develop a journal writing prompt (see Teacher Resource, <i>Journal Writing – Forms and Sample Stems</i>). Model the form of writing to be used if it has not been modelled before. (see Teacher Resource, <i>Journal Writing – Developmental Stages</i> and Teacher Resource, <i>Journal Writing – Forms and Sample Stems</i>). 	<ul style="list-style-type: none"> Learn the journal form and the response style.
During <ul style="list-style-type: none"> Assign the journal entry in one of three formats: class, group or personal journal. (see Teacher Resource, <i>Journal Writing – Developmental Stages</i>). 	<ul style="list-style-type: none"> Students respond to the journal prompt: as a class to a class journal, as a group (3 or 4 students) in a group journal, or individually in a personal journal.
After <ul style="list-style-type: none"> Respond to the journal entry. This must initially be done after each journal assignment until such time that the students are confident that the teacher is an interested reader; then journal entries may be responded to after two or three journal assignments: <ul style="list-style-type: none"> respond as a comment; marking/grading will often stop students from responding freely. start the response with a positive comment (on effort, honesty, style, use of terminology <i>something</i>). comment on the central concept. ask a question to help clarify or to further the student's thinking. do not grade grammar and spelling; this is their opportunity to express themselves freely, on their terms, not the teacher's. comment on grammar and spelling in a 'coaching' mode, and <u>only after</u> a 'safe place' has been established. 	<ul style="list-style-type: none"> Read/listen to the response and respond back to it if it included a return question.

Notes



Journal Writing – Developmental Stages

Journals in the mathematics class should be introduced in three stages : Class Journals, Group Journals, and Individual Journals. There are a variety of journal entry forms (see Teacher Resource, *Journal Writing – Forms and Sample Stems*) and students cannot be expected to understand either a journal form or how to respond to a journal prompt without some specific instruction rooted in modeling. Hence, *each form* of journal writing must be introduced through these three stages; the stages are *not* passed through only once.

The first stage is the **Class Journal**. This is where the teacher models both the writing form and the style in which students may respond.

- Tell the students the name of the form of writing e.g., list, personal writing, self-assessment, instructions etc.
- Give the class the journal prompt and ask for individual responses.
- Write their responses, *using their exact words*, on the board, overhead, chart paper, or whatever you've chosen as your journal medium.
- Do not write corrected grammar; it is important to honour the students' responses in order that their ideas be the focus of the exercise, not the syntax carrying them (see Tips and Resources).
- With *Class Journals*, the response is immediate and to the whole class; ideas are discussed, and ideas requiring refinement or correction are addressed through questioning rather than through telling – “pointing to the kitchen rather than feeding intravenously” is an analogy. The teacher's role is to facilitate reasoning and communication, not to evaluate it.

The second stage is the **Group Journal**. This stage affords semi-independent practice of both a writing form and a response style.

- Give the students a larger format notebook in which to write, illustrate and/or figure.
- Students gain confidence in their understanding of both the forms of writing and the acceptable response styles (previously modelled).
- Students get a chance to explain their own understanding as well as to compare and contrast with the understanding of others in an effort to synthesize a common response.
- *Group Journal* entries can be shared among groups or with the whole class. They can be responded to by the teacher, another group, or by the whole class.

The third stage is the **Personal Journal**. At this stage students write journal entries independently and the journal writing reaches its full potential. However (!), there must never be a race to get to this stage just because of that; not until the particular writing form and acceptable response style are well understood should the personal journal be used. After all, it is the thinking that must be free-flowing, unimpeded by a struggle with form or style, if journal writing in the mathematics classroom is to be of benefit to the student.

To reiterate, once the students have passed through the three developmental stages with a particular form of journal writing (e.g., problem design) then all three stages must again be passed through if a new form is introduced. This point cannot be overstated; using individual journal entries too soon takes up more teacher time in the end and frustrates both students and teachers.

“I’m glad that I didn’t give up on math journals when I first started a year ago [without instruction]. When I started again [after instruction], I did far more modeling and as a class we did a lot more talking ...”
Anonymous Ontario Teacher



Journal Writing – Forms and Sample Stems

Forms	Stems, Starts, Ideas
1. Personal Writing <i>reflecting on feelings, attitudes, successes, challenges</i>	<ul style="list-style-type: none"> - I think I'm good/weak in working with fractions because ... - When I'm asked a question in class I ...
2. Summaries <i>answering the question, "What did you learn?"</i>	<ul style="list-style-type: none"> - Create a poster about today's lesson to advertise it. - Brainstorm everything you know about probability; linear relations ; polynomials ...
3. Definitions <i>defining math terms in their own words to show understanding (may be used as part of a personal math dictionary)</i>	<ul style="list-style-type: none"> - Explain what is meant by the term 'polygon'. - What is a linear relationship? Give an example.
4. Translations <i>taking information from one source and having the students put it in their own words</i>	<ul style="list-style-type: none"> - Draw a diagram/picture to show what the word problem describes. - What did you learn from your graph in question #3?
5. Reports <i>after a series of lessons or a unit, bringing understanding together</i>	<ul style="list-style-type: none"> - We have looked at mean, median and mode ... Report on how they are the same/different. - Report on the survey that you took (topic, method, results and conclusions).
6. Instructions <i>writing a series of steps in a procedure</i>	<ul style="list-style-type: none"> - How do you find the centroid of a triangle using Geometer's Sketchpad? - How do you use your calculator for linear regression?
7. Lists <i>making a list (this is the easiest form of writing for students with communication difficulties; it requires no particular syntax)</i>	<ul style="list-style-type: none"> - List all the things you still need to do to complete your math project. - List different forms of a linear relation. - Make a list of all the things that can be changed after you press the MATH key on the graphing calculator.

**Journal Writing – Forms and Sample Stems (continued)**

Forms	Stems, Starts, Ideas
8. Self-assessments <i>giving feedback or comments about math work, learning experiences</i>	<ul style="list-style-type: none">- The hardest problem was ...- I think I could do better if ...
9. Descriptions <i>describing procedures, conversations, group work ...</i>	<ul style="list-style-type: none">- Our group had trouble agreeing on ...- The two different solutions that we got were ...
10. Arguments/Justifications <i>persuading others of a point of view, refuting other points of view, justifying a choice ...</i>	<ul style="list-style-type: none">- The most efficient way to solve this problem is ...- I assumed a value of ____ for the width because ...
11. Explanations <i>reasoning, findings, terms, attempts, strategies, answers, procedures, patterns, suggestions</i>	<ul style="list-style-type: none">- A calculator was not necessary to solve this problem because ...- If we had to double the volume we would change ...- There was more than one possible solution because ...
12. Applications <i>where this math/lesson could be used</i>	<ul style="list-style-type: none">- How would a person in the field of medicine use mathematics?- How could a surveyor use the Pythagorean theorem?- Could a graph of a linear relation be used at a car rental business? Explain.
13. Problem Design <i>student creates a problem that has to incorporate specific criteria</i>	<ul style="list-style-type: none">- Create a problem around the given graph.- Create a problem that can be solved by using the equation $2x - 17 = 539$- Create a problem that requires knowing that the alternate angles between parallel lines are equal.